Explanatory Power of the Tourist Destination Competitiveness Index on the Control of the First Wave of COVID-19

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Introduction

The COVID-19 outbreak has produced significant devastation in many economies worldwide, being those depending on travel and tourism (T&T) the most affected. The World Travel and Tourism Council (2019) estimates that T&T contributed 10.3 percent of the global Gross Domestic Product (GDP), supporting around 330 million jobs worldwide. They also estimated one out of 10 jobs in 2019 was supported by the T&T industry worldwide and that one out of four new jobs created in 2019 came from the T&T sector. Similarly, the United Nations (UN, 2020) highlights that the T&T constitutes the livelihood of millions, representing over 20 percent of the GDP for some countries. UN asserts that T&T is the third-largest export sector of the global economy and one of the most impacted by the COVID-19 pandemic. In the same report, the UN informs an expected decline in international tourism ranging between 58 and 78 percent in 2020. They also anticipate a major drop in visitor spending from $1.5 trillion in 2019 to a range of $310 and $570 billion in 2020. This extreme impact has placed over 100 million direct T&T jobs at risk.

We study a sample of one hundred and thirty-two countries with available data for our dependent and independent variables. Our dependent variables include the government's daily average stringency index, the national outbreak response time, the daily average of cases and deaths per million, the speed of contagion/spread of the coronavirus per country, and the time from the first case reported in China to the first case reported nationally. Our independent variables include the 2019 Travel & Tourism Competitiveness Index (TTCI) and some of its constituent sub-indexes and pillars.

Literature Review

On its most recent tourism barometer, the UN World Tourism Organization (UNWTO, 2021a) reports an expected decline of international tourism of over 70 percent in 2020, a similar level back 30 years ago. This decline constitutes around 900 million fewer international tourist arrivals in 2020 compared to 2019, and a 2020 loss of export revenues from international tourism of about US$935 billion, more than 10 times the loss in 2009 resulting from the global financial crises of 2008. Similarly, the UNWTO (2020) on its impact assessment of the COVID-19 outbreak on international tourism estimated a decline between 70 and 75 percent for the 2020 international arrivals. Likewise, the World Travel and Tourism Council (2020) estimates an unprecedented T&T job loss of 100.8 million in 2020, which represents an approximate 31 percent decline of all T&T jobs worldwide, and a T&T global GDP decline of US$2.7 trillion also in 2020, which constitutes a decline of 30 percent of the T&T sector worldwide.

The goal of this research work is to provide statistical evidence about the explanatory power of the 2019 TTCI on the control of the first wave of the COVID-19 pandemic. Calderwood and Soshkin (2019) with the sponsorship of the World Economic Forum (WEF) compiled the 2019 TTCI. The WEF calculates the TTCI (IV1) biannually in the context of their Industry Program for Aviation, Travel, and Tourism, as a fundamental component of their Platform for Shaping the Future of Mobility. The TTCI compares the Travel & Tourism (T&T) competitiveness of 140 countries and assesses those national factors and policies that allow sustainable development of the T&T industry sector, which in turn, promotes a country's development and competitiveness. The TTCI comprises four sub-indexes, fourteen pillars, and ninety individual indicators. The four sub-indexes are the enabling environment sub-index, the T&T policy and enabling conditions sub-index, the infrastructure sub-index, and the natural and cultural resources sub-index.

Methodology

Our sample includes one hundred and thirty-two countries with available data for our dependent and independent variables. We excluded countries with a population of less than a quarter-million people to avoid outliers in our dependent variables. We also excluded countries with internal conflicts (Libya, Yemen, and Syria) and countries with external political conflict affecting their capacity to control the COVID-19 outbreak (Iran and Venezuela). Our dependent variables include the government's daily average stringency index (DV1), the outbreak response time (DV2), the daily average of cases per million (DV3), the daily average of deaths per million (DV4), and the speed of contagion/spread of the coronavirus (DV5), and the time from the first case reported in China to the first case reported nationally (DV6). Like Erdem (2020) and Herren et al. (2020), the data of our dependent variables were compiled by Hannah et al. (2020) and retrieved from Our World in Data. The starting outbreak date varies from country to country; however, no country has a beginning date earlier than December 31, 2019. Nevertheless, all countries in our sample have the same ending date on July 10, 2020.

The government's daily average stringency index (DV1) is a variable based on nine response scores, including but not limited to, school closures, workplace closures, and travel bans. This index is quantified on a scale from zero to one hundred, where one hundred represents the strictest government response to the COVID-19. The daily average of this index for each country in our sample is determined from the first reported case's date until July 10, 2020. The outbreak response time (DV2) is defined as the number of days between the first reported case's date and the date of the first maximum of the curve resulting from the 5-day moving average of the daily new cases. This methodology is similar to that of Bjørnskov, C. (2016), who finds a negative relationship between the recovery time measured by the peak-to-trough ratio of real GDP per capita and the initial economic freedom, although he studies crises of economic nature. The daily average of cases and deaths per million (DV3 & DV4) was calculated by dividing the total cases and deaths per million by July 10, 2020, over the number of days since the first case's date. The speed of contagion/spread of the coronavirus (DV5) is defined as the approximation of the first derivative of the curve of new cases per million. This approximation was determined by calculating the average daily change of new cases per million from the first reported case's date until July 10, 2020. The outbreak arrival time (DV6) is defined as the time from the first case reported in China to the first case reported nationally, which intends to measure how fast the COVID-19 was brought to a particular country in our sample. Our primary independent variables (IV1) include the 2019 TTCI and some of its constituent variables. The TTCI's sub-indexes and pillars selected as relevant independent variables include the travel & tourism policy and enabling conditions (IV2), infrastructure (IV3), health and hygiene (IV4), information and communication technology (ICT) readiness (IV5), prioritization of travel & tourism (IV6), international openness (IV7), air transportation infrastructure (IV8) and ground and port infrastructure (IV9).

The enabling environment sub-index measures the general conditions necessary for operating a business in a country and includes five pillars. These pillars are a country's business environment, safety and security, health and hygiene (IV4), human resources and labor market, and ICT reediness (IV5). Only two out of these five pillars were included in our analysis. The travel & tourism policy and enabling conditions sub-index (IV2) measures the particular national policies and strategies with a direct impact on the T&T industry sector. This sub-index includes four pillars, namely the prioritization of T&T (IV6), international openness (IV7), price competitiveness, and environmental sustainability. Only the first two pillars listed before were included in our analysis. The infrastructure sub-index (IV3) measures the quality and availability of each country's physical infrastructure and includes three pillars. These three pillars are air transportation infrastructure (IV8), ground and port infrastructure (IV9), and tourism service infrastructure. Only the first two pillars listed before were included in our analysis. The natural and cultural resources sub-index measures the main reasons to travel and includes two pillars, namely the natural resources and the cultural resources and business travel. Our analysis excludes this sub-index and all of its constituent pillars and indicators.

The health and hygiene pillar (IV4) includes, but is not limited to measuring access to potable drinking water and sanitation, the availability of physicians and hospital beds, prevalence of HIV (human immunodeficiency virus), malaria, etcetera. The ICT readiness pillar (IV5) captures not only the nature of a modern ICT hard infrastructure (i.e. mobile network coverage and reliability of power supply) but also the capability of businesses and people to benefit and provide online services. The prioritization of the T&T pillar (IV6) measures the extent to which a government prioritizes the T&T sector by channeling project development funds and resources necessary to develop this industry. The pillar includes, but is not limited to, the effectiveness of national T&T marketing campaigns and country brand, government spending, the completeness and timeliness of T&T national data supply to international organizations, etcetera. The international openness pillar (IV7) assess the degree of a country's openness and travel facilitation It includes but is not limited to, a government's openness of bilateral air service agreements, number of regional subscribed trade agreements, visa requirements, etcetera. The air transportation infrastructure pillar (IV8) measures the quantity of air transportation, using variables such as available seat kilometers, number of departures, airport density, and number of operating airlines. It also measures the quality of air transportation infrastructure for domestic and international flights. The ground and port infrastructure pillar (IV9) assess the availability of road and railroad network, measured by road and railroad densities, including roads, railroads, and ports infrastructure satisfying international standards.

Finally, we selected some control variables that have exhibited explanatory power over our dependent variables (Dempere, 2020.) These variables include the population density (CV1) compiled by Hannah et al. (2020) and the urban population as a percentage of the total population (CV2) compiled by the World Bank (2020). The last control variable is the freedom of foreign movement (CV3) defined as the extent to which a country's citizens can travel freely to and from their country and emigrate without restrictions from government authorities. The V-Dem Institute (2020) compiles this last control variable.

We analyze our data using generalized linear models, which are made up of a linear predictor $\eta_i = \beta_0 + \beta_1 X_{1i} + \cdots + \beta_p X_{pi}$; and two functions, namely a link function that describes how the mean $E(Y_i) = \mu_i$, depends on the linear predictor $g(\mu_i) = \eta_i$; and a variance function that describes how the variance, var(Y_i) depends on the mean var(Y_i) = $\phi V(\mu)$, where the dispersion parameter ϕ is a constant. In the case of our general linear models with $\epsilon = N(0, \sigma^2)$, we have the linear predictor η_i specified above, the link function $g(\mu_i) = \mu_i$, and the variance function

$V(\mu_i) = 1$. We also use weighted least squares models to study the explanatory power of our independent variables over our dependent ones. When a model specification $Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + u_i$ has a heteroskedastic variance $var(u_i) = \sigma_i^2$, we can divide each term by the weight $\omega_i = 1/\sigma_i$, to adjust the independent variables and transform the original equation into $\omega_i Y_i = \beta_0 \omega_i + \beta_1(X_1 \omega_i) + \beta_2(X_2 \omega_i) + \ldots + \beta_k(X_k \omega_i) + u_i\, \omega_i$; which is the same as $Y_i^* = b_o X_{0i}^* + b_1 X_{1i}^* + b_2 X_{2i}^* + \cdots + b_k X_{ki}^* + u_i^*$; but with homoscedastic variance $var(u_i^*) = var\left({}^{u_i}/{}_{\sigma_i}\right) = var(u_i)/\sigma_i^2 = 1$. We used the logarithmic transformation of our dependent and independent variables when running these regression models.

Results

We classified our sample using the 2019 TTCI (IV1) from highest to lowest and identified the first (lowest or Q1) and fourth (highest or Q4) quartiles. Table 1 shows that countries with the highest TTCI (Q4) have the lowest daily average stringency index (Q4:27.92 vs. Q1:53.16), the shortest outbreak response time (Q4:74.3 days vs. Q1:99.9 days), and the highest daily average of cases per million (Q1:4.56 vs. Q4:22.3.) These countries also have the highest daily average of deaths per million (Q4:1.63 vs. Q1:0.15), the highest speed of contagion/spread of the virus (Q4:2.12 vs. Q1:0.26), and the shortest outbreak arrival time (Q4:39.70 days vs. Q1:77.36 days). These results suggest that on average and *ceteris paribus*, countries enjoying the highest TTCI did not impose strict restrictions on their citizens to control the first wave of COVID-19. Such restrictions may have been considered initially as incompatible with a reputable T&T destination. However, these same countries could react faster to control the first wave of the outbreak, but this faster response did not avoid the highest daily average of cases and deaths per million experienced by these countries. Similarly, these high TTCI countries experienced the highest average rate of contagion/spread of the virus and the quickest arrival of the virus to their communities.

Table 1: Independent Samples Test Results. Dependent Variables

2019 Travel & Tourism Competitiveness Index (IV1)						
	DV1	**DV2**	**DV3**	**DV4**	**DV5**	**DV6**
Q1	53.16	99.88	4.56	0.15	0.26	77.36
Q4	27.92	74.3	22.30	1.63	2.12	39.70
***t*-sta.**	4.99	2.74	-5.18	-4.5	-3.83	9.55
***p*-val.**	[0.00]****	[0.008]***	[0.00]****	[0.00]****	[0.00]****	[0.00]****

Notes: ****, ***, ** and * denote statistical significance at the 0.1%, 1%, 5%, and 10% significance level, respectively. We repeat the same tests using the logarithmic transformations of our dependent and independent variables with the same results in terms of statistical significance, but these additional tests were omitted in this report.

We also classified our sample using our dependent variables from highest to lowest and identified the first (lowest or Q1) and fourth (highest or Q4) quartiles for each of them. Table 2 (omitted in this abstract) shows the independent sample tests of our independent variables for the first and fourth quartiles of each of our dependent variables. The statistically significant results show that countries with the lowest daily average stringency index and the shortest outbreak arrival time have (*ceteris paribus*) the highest TTCI, better travel & tourism policies and enabling conditions, superior infrastructure, health and hygiene, ICT readiness, prioritization of travel &

tourism, international openness, air transportation infrastructure, and ground and port infrastructure. Table 2 also shows similar significant results for countries with the lowest outbreak response time, except that the TTCI, prioritization of travel & tourism, and the air transportation infrastructure are not significant at conventional levels of confidence.

Table 2 (omitted in this abstract) also has statistically significant results for countries with the highest daily average cases per million and the highest speed of contagion who have (*ceteris paribus*) the lowest TTCI, worse T&T policies and enabling conditions, inferior infrastructure, health and hygiene, ICT readiness, prioritization of T&T, international openness, air transportation infrastructure, and ground and port infrastructure. Correspondingly, table 2 (omitted in this abstract) shows similar significant results for countries with the lowest highest deaths per million, except that the prioritization of travel & tourism is not significant at conventional levels of confidence. Tables 3-8 (omitted in this abstract) show the results of the cross-sectional analysis using our generalized linear model. The analysis of these results will be available in the final version of this article.

Conclusion and Discussion

Our study has several limitations. Morris and Reuben (2020) recognize several limitations associated with efforts for international comparison of the COVID-19 pandemic. They identify discrepancies in how countries record COVID-19 deaths, variances in testing efforts, differences in health services, untrustworthy data from countries with non-democratic political systems, and many demographics variables such as average age, population density, urban versus rural population, age structure, etcetera, affecting the pandemic.

Our results may be crucial for decision-makers at all levels, particularly for top policy-makers, managers, and planners from local/national government and business authorities. The aim is to provide an insight into the impact of our county sample's T&T strengths and weaknesses at controlling the first wave of the COVID-19 pandemic. The results can help policymakers to change their catastrophic disaster management strategies and practices. Correspondingly, interested and responsible stakeholders can learn from our results by filling policy gaps that our analysis may provide. Our results may also help to trigger a dialogue about the proper T&T policies, infrastructure, and management systems to face future similar challenges like those posed by the 2020 coronavirus crises.

References

Bjørnskov, C. (2016) 'Economic freedom and economic crises.' *European Journal of Political Economy*, Vol. 45, supplement, pp. 11-23. https://doi.org/10.1016/j.ejpoleco.2016.08.003

Calderwood, Laureen, and Soshkin, Maksim (2019). "The Travel & Tourism Competitiveness Report 2019. Travel and Tourism at a Tipping Point." *World Economic Forum* (WEF). Available at https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2019 (accessed on January 22, 2021.)

Dempere, Juan (2020). "A Recipe to Control the First Wave of COVID-19: More or Less Democracy?" *Transforming Government: People, Process, and Policy, Forthcoming*. Available at https://www.emerald.com/insight/content/doi/10.1108/TG-08-2020-0206/full/html

Erdem, O. (2020), “Freedom and stock market performance during Covid-19 outbreak”, *Finance Research Letters*, Vol. 36, available at https://doi.org/10.1016/j.frl.2020.101671

Hannah, R., Ortiz-Ospina, E., Beltekian, D. Mathieu, E. Hasell, J. Macdonald, B. Giattino, C. and Roser, M. (2020), “Statistics and research. Coronavirus pandemic (COVID-19).” *Our world in data*, available at https://ourworldindata.org/coronavirus (accessed July 10, 2020).

Herren, C.M., Brownwright, T.K. Liu, E.Y. El Amiri, N., and Majumder, M. (2020), “Democracy and mobility: a preliminary analysis of global adherence to non-pharmaceutical interventions for First wave of COVID-19”, *working paper*, available at https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID3570206_code4099104.pdf?abstractid=3570206&mirid=1 (accessed January 10, 2021)